

Periodic Table Databases

[Roger Gladwin](#)

CTI Centre for Chemistry, University of Liverpool, UK

Introduction

Periodic Table databases are increasingly becoming the universal chemistry software products. There are versions for all the major computer platforms, including those which run over the World Wide Web. Some come on floppy disks, others contain so much information that a CD-ROM is required whilst others can display video sequences using associated video disks. Some are stand-alone programs in their own right whereas others are tools to be called when appropriate from other software. Some are simply catalogues of data for viewing as necessary and others attempt to teach users about the periodic table, its structure, its history etc. At least one includes a 'mentor' who acts as guide to a student who is seeking to answer a question set by a teacher. Such problems may be, "suppose the world supply of copper was catastrophically reduced due to a war, suggest another element which might be used to produce electrical wire". The student could ask the 'mentor' for help - the response may be to suggest looking at the property ductility to find elements similar to copper. Similarly the student could be directed to look at electrical conductivity, earth abundance etc. until a suitable alternative is found. All have one thing in common, they attempt to show the properties of the chemical elements in an ordered fashion.

One advantage that most have is the ability to display data graphically. This may be by showing, for example, on a graphic of the periodic table, the physical state of the elements. As the temperature is (say) raised from room temperature the representation changes as more and more elements melt or vaporise.

More commonly, programs allow users to display properties as scatter, line or bar/column plots. (In reality, the data is not continuous and should not be displayed as a line plot; however, the advantage of showing the data in such a form outweighs the error). Here students can be presented with (say) a plot of atomic radii vs atomic number for the first 3 or 4 periods or the electronegativity of the halogens down the group with the requirement to explain the shape of the plot.

Those programs that come on CD-ROM or with an additional video-disk can also include animations, still photographs and audio/video sequences. These might include animations of flame tests, animated sequences showing crystal structures, photographs of the elements or the common ores, photographs of historical figures from the field of chemistry, poems and songs about the elements and video sequences of explosive/dangerous reactions (e.g. the reaction between hydrogen and fluorine, the reaction between the alkali metals and water).

So What Are the Advantages of these Programs?

The programs offer a compact set of data on the properties of the elements which can be interactively interrogated by users. The data extracted can be viewed graphically to look for

trends and/or sorted to look for similarities in the properties of the elements. The programs can be used to present information within a lecture or used in a tutorial or in self-study where the student is tested with open-ended questions.

Those programs which are marketed with CD-ROM or video disk can incorporate photographs/ video/ sound (particularly useful in lectures to demonstrate dangerous reactions or to practise observation skills etc.).

On the Downside, What Are the Disadvantages?

The student may be overloaded with too much data and use the programs ineffectively. Thus it is necessary for the teacher to set clear aims and objectives. Some programs may not have reliable data sources or contain errors in transposition to the electronic form. In view of the prevalence of student gullibility, particularly with data obtained from a computer, this needs careful monitoring (maybe look initially for a program where the data sources are given). The systems which come with CD-ROM or video disk obviously have extra hardware requirements. In addition, particularly over a network, access times for users may be long.

References

The Chemistry Set <http://www.new-media.co.uk/products/chemset.htm>
Interactive Periodic Table <http://www.cdaccess.com/html/pc/periodic.htm>

Reviews of Periodic Table Databases:

Periodic Law, *J. Chem. Ed.* **65** (12), A333 (1988)

Chemistry Works, *Software Reviews* **7**, 18 (1993)

In addition, see the following references for products which have been peer reviewed via *J. Chem. Ed.: Software*.

"KC? Discoverer for Apple II", *J. Chem. Ed.* **68**, 956 (1991)

"KC? Discoverer for DOS", *J. Chem. Ed.* **65**, 695 (1988)

"KC? Discoverer with Knowledgeable Counselor for DOS", *J. Chem. Ed.* **69**, 40 (1992)

"The Periodic Table Stack for Apple Macintosh", *J. Chem. Ed.* **66**, 756 (1989)

"The Periodic Table Videodisk", *J. Chem. Ed.* **66**, 19 (1989)

Roger Gladwin
CTI Centre for Chemistry
University of Liverpool
P.O. Box 147
Liverpool
L69 3BX U.K.
ctichem@liverpool.ac.uk